3. Joining, Lambing and Lamb Management

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Learning objectives

Students will understand:

- key factors that determine effective ewe conception rates
- factors that influence ram fitness for joining
- how real time ultrasound scanning fits into an annual flock reproduction program
- the range of predators that influence lamb survival
- the differences between primary and secondary predation
- how to identify different reasons why lambs die from birth to two weeks of age
- the importance of monitoring post-weaning growth and fat score in meeting a target market
- pasture or feed requirements for both ewes and lambs post-weaning
- the importance of ewe fat score recovery between weaning and their next joining

Key terms and concepts:

Foetal growth; Real time ultrasound scanning; Fat score and nutritional targets; Predation; Lamb loss; Birth trauma; Lambing management; Liveweight and fat score targets for weaners; Fat score and nutritional targets for ewes post-weaning; Internal parasite control; Ram fertility; Ewe fertility and fecundity

3.1 Introduction

This topic overlaps with the previous topic and provides further notes on the management of the ewe during joining, pregnancy, lambing and before weaning. The birth of live, healthy lambs is the ultimate goal of the reproductive system. Good ewe lactation performance is crucial for efficient and profitable lamb production, particularly with intensive systems. Sufficient milk production by the ewe ensures good lamb survival and early growth rate prior to the lamb's increasing reliance on herbage as the rumen develops from around three weeks of age. Persistency of milk production enhances lamb growth until weaning at 10-14 weeks of age.

Targeted nutrition is essential to achieving high flock reproductive performance. Throughout this topic there will be reference to pasture benchmarks required to ensure nutritional requirements are met. These will be described in terms of herbage mass (kg DM/ha) and herbage quality (% DM digestibility). So as to reliably meet these pasture benchmarks, the timing of phases on the breeding calendar must synchronise with the seasonal supply of pasture.

The period from mid pregnancy through to lamb marking and weaning is critical to the profitability of the sheep enterprise. The fact that lamb losses from birth through the end of the first week of life can be huge should alert managers to examine all aspects of the production system and put actions in place to ensure that these losses are minimised. This needs to be done in a coordinated way to cover all variables that cause reproductive wastage in the flock.

3.2 Joining management

Ewe fat score at joining

Ovulation rate at joining depends largely on the body reserves (fatness) of the ewe but there is some additional impact of nutrition levels at the time of joining. At the same fat score, ewes that are gaining weight are more likely to have a higher proportion of twins than ewes of the same fat score that are either maintaining or losing weight. The quantity and quality of both pasture and

supplements controls this effect. Joining on green rather than dead pastures and feeding high quality supplements like lupins may improve the conception rate.

Table 3.1: Effect of increasing liveweight at joining on percentage of lambs born.

Joining liveweight(kg)	Expected lambs born /100 ewes joined	
	Merino ewes	Crossbred ewes
Kilogram	%	%
40	92	-
45	100	118
50	108	126
55	116	134
60	124	142

Critical live weights for joining

At joining there is a critical live weight below which there will be a higher percentage of dries and a lower twinning rate. It is important to ensure that ewes are well above this weight. Critical body weights are approximately 40 kg for medium wool Merinos and 45 kg for first-cross ewes. This varies with frame size and it is useful to think of fat score two as a critical lower level for successful joining, regardless of ewe size. The negative impact of joining at or below fat score two is worse when ewes are joined outside their breeding season.

Maiden ewes

It is critical that maiden ewes reach the target weights shown in Table 3.They are the biggest age group and their performance is important to the overall performance of the flock.

Age at first joining

First cross ewes can be joined as young as 7 months and merinos as young as 7 to 9 months. However to do this they must reach 45 kg at joining to be cycling effectively. Good nutrition is essential over the next year to ensure a successful next joining. If they are given good nutrition during this period they are likely to have slightly better joining performance at subsequent joinings.

Monitoring your progress

Weighing and fat scoring an indicator group from each mob is a useful technique. The critical times to monitor are during weaning, a month before joining and in conjunction with other husbandry activities. This develops the basis for sound nutritional management during the pre-joining period. Table 2.2 shows the number of monitor animals required to accurately estimate the average of a mob. Select these animals at random and identify them with an ear tag so the same animals can be weighed each time.

Table 3.2: Suggested size for monitor groups.

Total mob	Monitor group
100	30
500	40
1000	50

Ram management for joining

It is important to maintain ram condition and health throughout the year but pay particular attention in the two months preceding joining. A sperm capable of fertilisation commences its development 49 days prior to the act of mating. In a six-week joining, all the sperm used by the ram will have started development before the first day of joining. A decline in ram nutrition or health during this period will mean the ram is not fully effective at the time of joining. It is important to buy ram replacements at least two months before joining to allow enough time for pre-joining preparation. Buy replacement rams only from studs that can demonstrate they are free of ovine brucellosis.

The effect of overheating

Sperm development can also be severely disrupted by excessive heat. The scrotum
regulates the temperature of the testicles at approximately five degrees lower than core body temperature. A rise in temperature due to climate, disease or infection can be enough to destroy

the store of viable sperm. Special attention should be paid to preventing fly strike due to the fever it causes. Rams shorn within two months of joining may suffer an increase in body temperature during hot weather, and this can lead to temporary infertility.

Where possible, time shearing so that rams will have at least 35 mm of wool at joining and also provide shade in the ram paddock. This will insulate rams against the effects of high temperatures without impeding mating or increasing fly strike susceptibility. For this reason it is recommended you shear rams twice a year. Merinos appear more tolerant to high temperatures than other breeds and some strains of Merino are more tolerant than others.

Rams with wrinkles are less able to handle high temperatures than plain rams.

Nutritional effects

Keep rams in fat score three for most of the year and increase their nutrition in the two months prior to joining. Size of testes varies greatly depending on the level of protein nutrition. Research has shown that feeding lupins for two months before joining can increase testicle size and cause as much as a 100% increase in sperm production.

Highly active rams will lose fat score during mating. Rams should approach fat score four at joining to ensure adequate body reserves for the duration of joining. Over-fat rams have lower serving capacity and reduced sperm viability.

Ram inspection

Rams should be inspected two months prior to and at joining for defects that will impair their joining performance.

4Ts (Teeth, toes, testes and tossle)

- Check their mouths to ensure they are sound and able to graze effectively.
- Check their feet and legs to ensure their mobility and ability to serve ewes. Any foot paring should be done carefully at least two months before joining to avoid lameness.
- Check their testes for size (at least 28 cm scrotal circumference) as well as for defects. Any abnormalities such as swelling, lumps, softness or swelling of the testicle or epididymus (small bulb at the bottom of the testicle) should be referred to a vet.
- Check to see there is no damage or abnormality of the penis that would prevent them serving the ewes.

A successful joining maximises the number of lambs conceived, implantation and survival of the embryo and early development of the placenta for good lamb birth weight and survival. The potential lambing percentage is determined during the mating to early pregnancy period by:

- Ewe and ram fertility;
- Ewe ovulation rates; and
- Successful establishment of the embryo.

If any of these factors is limiting, good management at other stages of the cycle may assist but will not remedy the situation.

Breeding season

Seasonality of breeding varies between breeds of sheep. Merino and Dorset ewes are less affected by season (they join nearly all year round) than Border Leicester or Border Leicester cross ewes. These first-cross ewes are less seasonal than pure Border Leicester ewes, which have a pronounced anoestrus. Figure 3.1 presents an indicative pattern of oestrous activity, and while only four breeds or crosses are shown, other breeds of sheep will also have their own breeding season and you need to know this pattern when deciding the time of joining you are going to use.

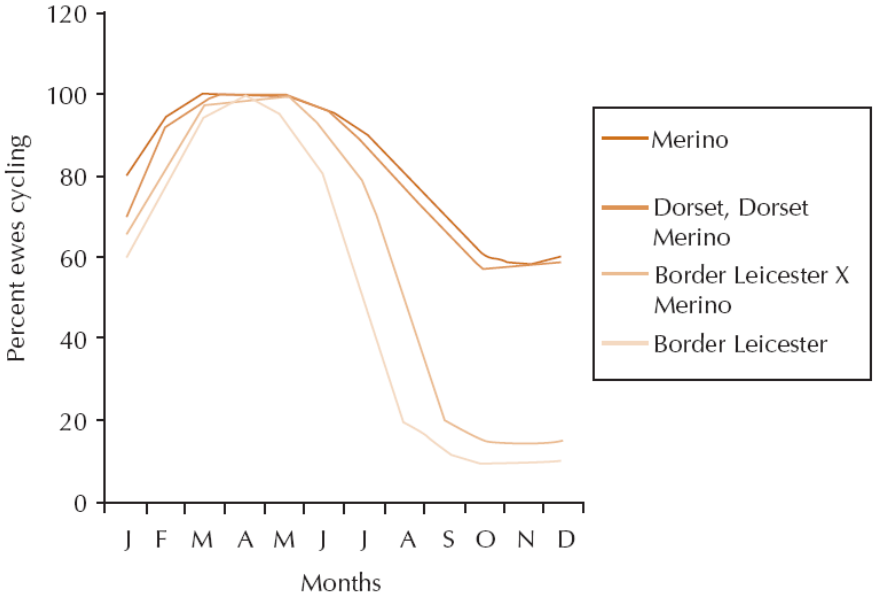
The length of the breeding season in sheep is regulated by day length, with shortening day length encouraging the onset of the breeding season.

During their breeding season, ewes normally cycle every 17 days. When a ewe is not cycling she is said to be in anoestrus, or her non breeding season. With British breeds this commences during June–July whereas for the Merino it is during October–December. Lactational anoestrus is a period of low fertility, commonly occurring for the 60 days after lambing.

Recommendations for successful joining

- Join for 42 days (two cycles + eight days).
- Join during the breeding season for best results.
- Maintain ewes in fat score three during joining.
- Join maiden ewes separately from older ewes, with a higher percentage of older
- experienced rams.
- Split older ewes into separate joining groups if body weight varies by more than 15 kg and ewes are below fat score 2. Join a higher ram percentage with low fat score ewes.
- Utilise the ram effect if joining out of the main breeding season.
- Ram percentage will vary according to the paddock in which sheep are mated, but
- 1% + 1 is a good guide.
- Ram harnesses can be used to monitor joining.
- Identify possible lambing paddocks at joining.

Figure 3.1: Indicative pattern of natural oestrus activity of various sheep breeds at different times of the year.



Ewes should be fat score three or better at joining to achieve a high pregnancy rate and good ovulation and should be maintained at that fat score during the joining period.

Puberty is the stage when a young ewe is mature enough to ovulate and become pregnant. It is dependant on body weight but usually occurs in autumn. Recommended minimum joining weights for maiden ewes were given in Table 3.

Two terms which are often referred to are *fertility*, which is the conception rate or the number of ewes pregnant, and *fecundity*, which is the ability to have multiples measured as the number of lambs per pregnant ewe. The components of ewe reproduction are fertility, fecundity and lamb survival and the following table represents the interaction between each of these.

Table 3.3: Interaction between fertility and fecundity.

Fertility is affected by:	**Fecundity is the result of:**	**Lamb survival depends on:**
Age at puberty	Ovulation rate	Lamb viability
Breeding season	Embryo survival	Rearing ability
Time since lambing	Breed	Environment
Ewe body weight		Predation
Birth weight		

Ovulation is the production of egg or eggs from the ovary of the ewe and occurs in a well defined cycle with the ovulation rate being lower at the beginning of the breeding season.

Heavier ewes at joining have a higher ovulation rate than lighter ewes. Any additional body weight above the minimum joining weight of 40 kg will result in more lambs.

For every 5 kg increase in body weight at joining, ewes will have 8% more lambs plus 1–2% fewer dry ewes.

Ovulation rate is affected by the stage of breeding season, breed, genetics, age, nutrition and other factors. Ovulation rate sets the upper limit to the number of lambs produced per pregnancy. There is considerable variation among breeds of sheep with respect to prolificacy and most of this variation is attributed to differences in ovulation.

Joining length

Joining should be for 42 days (two cycles + eight days) to ensure ewes have an opportunity to get into lamb. Maiden ewes have shorter, less intense heats and lower ram seeking ability than older ewes. The probability of oestrous detection and multiple services is decreased when maiden ewes are joined in a mob containing older ewes so maidens should be joined separately from older ewes.

Ram effect

Ewes that are constantly in contact with rams (running in adjacent paddocks) usually have a longer anoestrous period than ewes that have not come into any sight, smell, sound or other contact with rams or goat bucks. This can be a major problem when attempting to join first-cross ewes in the spring. Merino and Dorset cross ewes are less affected by the constant presence of rams and join readily in spring. How the ewe responds to the ram effect is a major determinant of the number of ewes that will cycle in the spring and thus the success of joining at this time.

Merino ewes can be stimulated to start cycling by introducing a ram (or teaser) whereas British breeds will only respond to the ram if introduced six weeks before the breeding season commences.

The sudden introduction of rams in spring to ewes that have been isolated from rams (no contact with rams during late winter/early spring) will induce the ewes to start cycling. This is known as the *ram effect*. For the ram effect to work successfully, it is important that ewes are not in contact (sight, sound or smell) with rams or goat bucks for at least one month before joining commences.

Ewes must experience a normal 17-day cycle before exhibiting a standing heat. This means that where a ram response occurs, most ewes will come on heat 17 or 25 days after the first ram or teaser introduction. Therefore rams need to remain with the ewes for at least 26 days after joining commences to obtain best results.

The major benefit of successfully using the ram effect is to achieve a high proportion of ewes in lamb over a short period of time, which will result in a more compact lambing. Ram harnesses or pregnancy scanning should be used to monitor the success of the ram effect.

Ram percentage

A ram to ewe percentage for joining of 1% + 1 ram per mob should be adequate if management and joining paddock conditions are ideal but should be higher with maiden ewes with their shorter oestrous cycle and if the joining paddock is not ideal. For every deviation from the ideal (for example large paddocks, light body weight ewes, number of watering points, aspects of the paddock that will reduce contact) one additional ram is added to the joining mob.

Maiden rams and ewes are both sexually inexperienced and if joined together lower lambing percentages can result. Maiden rams need to be joined to mature ewes for at least three weeks before they become efficient, effective workers.

Healthy active rams with at least one season's experience are best for maiden ewes. Maiden rams should be spread around the joining mobs with mature and experienced rams (at a ratio of two old rams per young ram) or alternatively join to mature ewes at a ram percentage of at least 2%.

Mob size

Mob and paddock size are important as they determine the opportunity for contact between ewes and rams and the opportunity for the rams to get ewes pregnant. The more obstacles within a joining paddock that can reduce contact between ewes and rams the higher the percentage of rams required. It is better to join larger mobs in smaller paddocks than small mobs in large paddocks as this will increase ram/ewe contact.

Monitoring joining
Using ram harnesses at joining allows you to check that ewes are cycling, rams are working and can assist to split ewes into lambing groups. Without using harnesses there is no other reliable way to determine if rams are working during the joining period. Ultrasound scanning can be used to determine the maximum lambing percentage post joining. Care needs to be taken when applying rams' harnesses to ensure they are fitted correctly and the harnesses should be inspected regularly during joining.

3.3 Preparing for lambing

Foetal growth
In early pregnancy there is no significant requirement for additional feed and ewes should be maintained at their joining fat score until scanning, at around day 100 after the start of joining. Nutrition of ewes through joining and pregnancy should be maintained to enhance embryo survival and implantation in the uterus.

Rapid weight gain or loss at joining may reduce embryo survival, consequently target weights and fat scores should be reached prior to joining. At about 40 days after conception the placenta begins to grow and continues its rapid growth until about day 95. This is followed by foetal development from day 90 to lambing. Foetal number is important and an indication of its effect is that singles, twins and triplets need at least double their maintenance ration at lambing. The placenta and foetus represents a considerable mass within the uterus and the forage/ration should be energy dense so as to enable sufficient intake.

The birth weight of a lamb is affected by sex, litter size, placental development, ewe condition, genetics, gestation length, and the timing, quality and quantity of nutrition during pregnancy. The average birth weight for singles or twins is different between years but an indication of a good pregnancy is where the average birth weight of twin second cross lambs is over 4 kg and, for twin Merino lambs, is over 3.5 kg. Lamb birth weight has a major bearing on lamb survival.

Real-time scanning
Pregnancy diagnosis to identify dry, single-bearing and multiple-bearing ewes is a practical procedure using real time ultrasound, which can bring about savings on resources, increase management options and monitor reproductive performance. By diagnosing ewes that are carrying more than one lamb, additional management can be adopted to ensure high survival rates.

Pregnancy scanning is conducted around 100 days from the commencement of joining to allow late lambs to be accurately identified. A short joining period is needed to ensure accurate detection of multiple pregnancies. Ewes should then be separated into dry, single or multiple lambing groups.

Nutrition
Ewes should have a target fat score of three by day 100, which corresponds with scanning, and from that period it is important to avoid severe under-nutrition. Metabolisable energy (ME) levels should be at 10 MJ/kg DM or better. Avoid major changes in nutrition of the ewe during pregnancy.

Table 3.4 shows the pasture requirements (kg DM green/ha) for ewes in late pregnancy and recommended pasture (kg DM green/ha) for ewes from scanning to lambing

Table 3.4: Pasture requirements (Kg DM green/ha) for ewes in late pregnancy and recommended pasture/Kg DM green/ha) for ewes from scanning to lambing.

Ewes	Days pregnant	
	Days 100–128	Last two weeks
Single bearing	900	1,000

Twin-bearing	1,000	1,200

Fat score four and five ewes

Ewes that are fat score four or five at day 100 (from start of joining) are usually over fat for lambing. To avoid spinal cord and other injuries at birth, fat score four or five ewes should be reduced by half a fat score. This can be done for about 28 days after scanning by grazing on pasture of 300 kg DM green/ha which is a significant nutritional restriction. After 28 days they should be grazed on the pasture recommendations in Table 3.4. Only restrict nutrition on over fat ewes if you know the stage of pregnancy. This four-week mid-pregnancy management strategy produces normal lamb birth weights and ewe gestation length.

Fat score four and five ewes also have a reduced intake in late pregnancy that reduces the amount of energy the ewe has for the lambing process. In addition these ewes have a hormonal imbalance that affects their ability to lamb and delays the production of colostrum.

The restricted ewes have higher intakes before lambing and minimal lambing problems.

However there are additional management inputs required to accommodate a six-week joining period and between ewe differences in initial fat score and weight loss. Using harnessed rams at joining will determine if a ewe has been mated and at what stage in the joining. This enables you to work out the number of days the ewe has been pregnant.

Controlling fat score at this stage of pregnancy will:

- Reduce risk of pregnancy toxaemia
- Reduce lambing difficulties
- Save feed
- Increase lamb birth weights and survival
- Provide flexibility if the season collapses.

Supplements

If you are unable to provide the pasture recommendations presented here it is necessary to provide a supplement. The use of a program such as GrazFeed® is recommended to determine the correct level of the high energy density supplement to be fed.

Vaccination prior to lambing

Ewes given a booster vaccination four to six weeks before lambing confer passive immunity on their lambs through the colostrum. The immunity lasts only six to eight weeks and a full vaccination program should be commenced at marking. Some vaccines also contain selenium to combat white muscle disease in selenium deficient areas or Vitamin B12 for cobalt deficiencies. Lambs should receive their first injection at marking then a follow up (booster) at weaning.A six-in-one vaccination as a minimum is recommended.

Predator control

Predators should be controlled at least six weeks before lambing commences. Foxes should be controlled annually during August/September regardless of time of lambing to control new born cubs. Control programs are also recommended for spring/summer joining.

Table 3.5: Predator risk and suggested action.

Predator	Problem or risk	Action
Feral pigs	Kill lambs	Poisoning, fencing
	Disrupt lambing	Shooting, trapping
Foxes	Kill viable and non-viable lambs Disrupt lambing	Baiting, fencing, shooting, guard dogs, alpacas
Crows/ravens	Injure and kill lambs	Trap and relocate
	Injure ewes	
Wild dogs	Kill adults and lambs	Bait, fencing, shooting, guard dogs, alpacas
Eagles	Can take viable lambs	Trap and relocate (seek permit from conservation agency)

Note: The removal of carcases and debris applies to all predators. For native birds check with the conservation agency in your state what can be done legally to limit the problem.

Shearing/crutching

Avoid shearing ewes six to eight weeks before lambing as it increases the nutritional requirements of the ewe to maintain body weight.

Crutching three to four weeks before lambing will clean around the udder and assist the new born lamb to find the teats on the udder, ensuring the lamb gets a feed of colostrum as soon as possible after birth.

Pregnancy toxaemia

Pregnancy toxaemia is a disorder of fat metabolism characterised by elevated levels of ketone bodies in the blood. Pregnancy toxaemia is the outward sign that the pregnant ewe has been suffering from nutritional stress for some time and is now critically stressed.

Multiple bearing ewes in late pregnancy have the highest nutritional demands. If these demands are not met they are more likely to succumb to pregnancy toxaemia. When more than one ewe is affected the multiple bearing ewes in the flock need better nutrition. Failure to provide this may result in unsatisfactory losses of pre lambing ewes and broader effects, including reduction in the ease of lambing, milk production and resistance to infection.

Nutrition as recommended in Table 3.4 will help to eliminate the problem. Prevention is cheaper and easier to manage.

3.4 Lambing

Lamb loss

Research has shown that typically 30% of all lamb losses occur during lambing or in the first week of life. There are many reasons why lambs die during the process of birth and a few days after lambing. The importance of each reason can vary from year to year. Table 3 shows the causes of lamb loss and what can be done to reduce them. The table shows that lamb losses can be reduced by management procedures that reduce the effects of weather, control predators and ensure adequate nutrition for the pregnant and lambing ewe.

Lamb losses are additive so that a low loss/high survival outcome is the result of managing the whole breeding system and not only one of the parts. This begins with mating, which sets the number of lambs to be born, continues through pregnancy to present a fit ewe at lambing and finally the selection and management of the lambing paddock. A common feature in lamb loss profiles is that both heavy and light weight lambs tend to perish, which is mostly due to management. Fortunately the number of lambs in these weight classes is generally low.

Starvation is a significant cause of lamb death and is frequently linked with mismothering.

If no injury has occurred during birth, starvation and mismothering is probably caused by poor quality ewe nutrition at lambing. This causes delayed onset of milk production for up to four hours. This delay is most common in twin-bearing ewes and often results in one lamb being orphaned. Lambing supervision procedures, pirating, and blocked/poor teats are among the list of other causes of starvation and mismothering.

Lamb losses from exposure do occur and are usually caused by hyperthermia (high temperatures) or hypothermia (low temperatures). Hyperthermia is associated with high ambient temperatures leading to dehydration, whereas hypothermia usually follows several hours of low temperatures brought about by wind of more than 3 km/h and rain with perhaps a wet birth coat. Maternal hyperthermia has been demonstrated in Queensland where ambient temperatures reach over 36ºC and shade is limited. The effect is reduced lamb birth weight and consequently survival.

Table 3.6: Sources of lamb loss at or just after lambing.

Loss category	Cause	Key areas to address
Birth injury/still-born	Brain bruising* - Dystocia, malpresentation, prolonged labour	Ewe fat score Rough handling
Starvation/mis-mothering	Delayed/poor lactation	Poor teats/udder Pirating Forage quality Inspection procedures
Supplementation techniques		Ewe density
Primary predation	Attack by birds, dogs, foxes or pigs	Identify predator Develop a control program Strategic baiting Synchronise lambing with neighbours Selection of lambing paddock
Exposure, hypothermia	Chill/cold, stress	Choice of lambing paddock Reduce wind speed through Shelter – strategic wind breaks, perennial grasses Topography Fencing
* haemorrhage in the cranial and spinal membranes		

Birth trauma

In birth the foetus is propelled through the cervix and vagina by muscular contractions of the uterus. For a rapid birth the previously closed cervix needs to be dilated and lubricated. Trouble can arise when the complex interplay of hormones is not in sequence and the contractions continue without a fully dilated cervix. This results in bruising of the head and neck and in some cases suffocation of the lamb.

The effects of such trauma can be seen at post mortem where there is bruising damage of various degrees to the brain and spinal cord. The cause of this source of death is not known but it is recognised that lambs from fat ewes are more likely to die this way.

In a good season, difficult births are significant, and in the past it may have been attributed to ‘big’ lambs. It is now known that the fat ewe is the problem, with dead lambs from fat ewes having more spinal cord injuries than lambs from leaner ewes.

Colostrum

The first milk found in the udder after lambing is called colostrum. It is full of immunoglobulins that protect the lambs from infection during the first few weeks of life and provide a quick source of energy for the lamb soon after birth.

Initially it is a thick, opaque liquid that is difficult to express from the udder. As lambing proceeds, the colostrum changes colour from yellow to cream to white, and its viscosity from thick to a liquid similar to milk.

The production and characteristics of the colostrum depend on the feed quality for the ten days prior to lambing, irrespective of fat score. Poor quality feed in the ten days prior to lambing tends to reduce colostrum production.

Ewes in fat score two or lower tend to produce colostrum that is thick, which makes it difficult for the lamb to suck. This is particularly important if these low fat score ewes are twin-bearing because they are under nutritional stress and will have two lambs competing for a small amount of milk. This is a common cause of starvation/mismothering in one lamb from a set of twin lambs.

Good nutrition just prior to lambing will both increase the amount of colostrum produced and make it runnier, which will assist the lamb to extract it from the udder and increase lamb survival.

Lamb predation

Predator control is about identifying the predator and recognising what steps should be taken prior to lambing to eliminating the predator.

Common predators include eagles, pigs, crows, foxes and dogs. Lamb losses range from individual animals to a large proportion of the drop.

Often the losses are not immediately apparent and for this reason pre-emptive action is recommended. This may involve:

- Changing the lambing paddock;
- Electrically fencing the lambing paddock;
- Altering time of lambing;
- Trapping;
- Poisoning;
- Guard animals;
- Providing alternative feed for the predators; or
- A combination of all these options.

Foxes are a common predator.

Predation can be either primary, where the predator attacks a healthy animal that would have survived if not attacked, or secondary, where the lamb was either in a weakened state (eg a deserted lamb) or already dead prior to attack (eg dead at birth).

On average, over 15% of lambs will die naturally in a flock and these lambs are candidates for secondary predation. The trouble is that the sheep producer recognises predation but is usually unaware that it is of a secondary nature.

Healthy foxes are rarely aggressive and are opportunistic scavengers.

Their diet includes rabbit, carrion, lamb, mice, insects, plants, berries, birds, lizards and other non-vertebrates, but placenta when available is not always eaten. This food supply will vary with season and may influence the need for a fox to become a primary predator.

Primary predation is an important area of lamb loss but not necessarily in every flock and every year. Predator control is about identifying the predator and recognising what steps should be taken prior to lambing to eliminating the predator. Community fox bating programs are a good example.

Ewe nutrition

Post lambing nutrition is important if lambs are to reach satisfactory weaning weights with the peak of the ewe's lactation occurring about 30 days after lambing. Ewes normally metabolise their body fat for milk production and the amount of weight they loose during lactation will depend on the availability of quality pasture. Table 4 illustrates the minimum quantities of green pasture for twin and single rearing ewes one month after lambing.

Table 3.7: Recommended pasture (kg DM green/ha) for ewes one month after the commencement of lambing and suggested lamb and ewe growth rates.

Ewes	Kg DM Green/ha	Lamb growth (g/d)	Ewe growth (g/d)
Single rearing	1,000	180	-70
Twin rearing	1,500	140	-110

Supplements

If supplements are to be fed through lambing it necessary to commence training ewes onto feed three weeks prior to lambing. Supplements will be needed to ensure ewes are accustomed to the feed. Locate the feeding site so that it can be seen from all parts of the lambing paddock and feed in the early afternoon as this will cause the least disturbance.

Lambing on forage crops such as oats/barley/winter wheat

When ewes are lambed on these grazing crops, birth weights are normal but in many cases a proportion of the ewes have to be assisted to lamb. This assistance usually only involves gentle traction.

It is not known what the cause is but the low dry matter (approx 25% DM) of these crops, together with the normal reduced pre-lambing intake, is the likely cause. Lambs, dry sheep and ewes in early pregnancy exhibit excellent growth rates when grazing these crops. If it were necessary to lamb on a forage crop it may be an advantage to supplement with a grain ration in the last two weeks of pregnancy. Adding 1% of limestone to the grain will reduce the risk of calcium deficiency. Crops above 30 cm in height may lead to mismothering, especially in highly fecund ewes.

Lambing management

Ewes with multiples should be given priority for shelter, supplements and quality forage, and need to be in their lambing paddock about one week prior to lambing. Single bearing ewes only need to go into lambing paddocks when the first lamb arrives. If no scanning data is available then put lambing ewes together but meet the requirements of the multiples.

See Table 4 for the recommended pasture levels in the lambing paddock. Lambing paddocks ideally have effective shelter that reduces winter wind speed to less than 8 km/h at lamb height, which is equal to a slight breeze. This is best achieved by:

- A northerly aspect, which protects stock from cold southern or westerly winds;
- Strategic windbreaks of trees and perennial grasses;
- Topography; and
- Fencing.

Night campsites also need to be well drained, have good shelter and water as well as aspect (fence off poor shelter such as the top of the hill). The winter campsite is often characterised as being well drained, elevated, and positioned where the sun hits first in the morning (in the NE corner).

Forage in lambing paddocks should be consistent with Table 4. If this is inadequate then a supplement should be provided. Supplements can be fed every second day between 2pm and 4pm, with feeding sites visible and accessible from all sections of the paddock.
If it is necessary for paddock inspections to be carried out these should be done between 2pm and 4pm when it is warmer and the social behaviour of the ewes and lambs is relaxed.

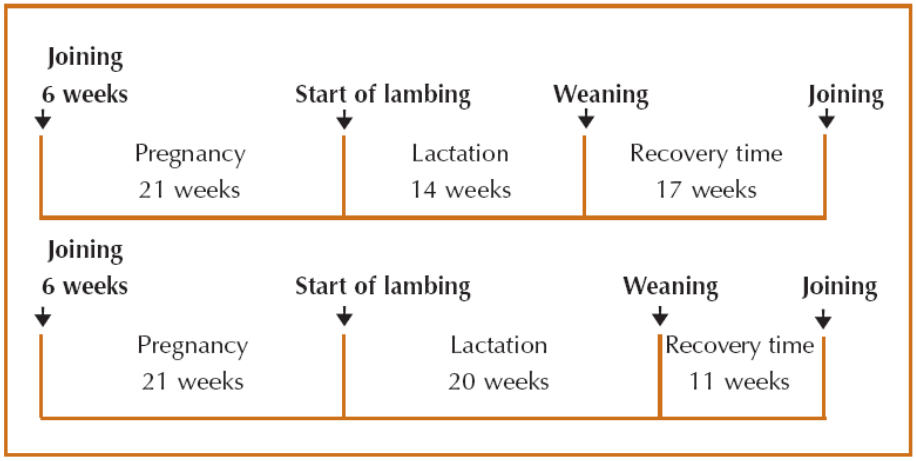
Mob size for lambing should be:
- Multiple bearing ewes: < 250 ewes
- Single bearing ewes: 400–500 ewes
- Maiden ewes: 250–400 ewes

A ewe density of less than 18 ewes/ha is recommended but ewes also need room at the sheep camp to spread out.

3.5 Ewe management after weaning

Preparation of ewes for their next joining starts at weaning. This period forms the foundation for a successful breeding program. Adult ewes should be fat score three to four at joining. Maiden ewes should also reach target body weights for joining.

Figure 3.2: The effect of time of weaning on ewe recovery times



Ewe fat score at weaning

Ewes can lose two fat scores or even more during lactation and need to regain a fat score of at least high 3 before joining. In 1st X ewes this represents about 16 to 20 kg live weight and in merino ewes about 12 to 16 kg.

After lambing it is usual for ewes to range widely in fat score. Ewes that reared twins will be quite lean while dry ewes and those that lambed and lost will be fatter. Drafting according to fat score at weaning time enables differential treatment to be given to ewes of different fat score. Ewes below fat score three should be given preference for high quality pasture in order to maximise their opportunity to achieve fat score three before joining.

Ewes already above fat score four should be allowed to lose body weight. The goal is to have as many ewes as possible approaching (but not over) fat score four at joining.

3.6 Review Questions

- List factors that influence ram fitness for joining that can be managed
- Describe key factors that determine ewe conception rates
- Outline how you would use ultrasound scanning to improve weaning rate performance
- How important is primary and secondary predation on lamb survival?
- What are the commonest reasons why lambs die from birth to two weeks of age and how do you identify causes of death?
- How do you achieve target weights and condition for a market
- How do you manage ewes post-weaning for their next joining?
- What would you add to the following topic summary:

Joining

- Rams should be checked at least two months before joining to ensure that they are fit to join.
- Join for 42 days (two cycles + eight days).
- Join during the breeding season for best results.
- Maintain ewes in fat score three during joining.
- Join maiden ewes separately from older ewes, with a higher percentage of older
- experienced rams.
- Split older ewes into separate joining groups if body weight varies by more than 15 kg and ewes are below fat score 2. Join a higher ram percentage with low fat score ewes.
- Utilise the ram effect if joining out of the main breeding season.
- Ram percentage will vary according to the paddock in which sheep are mated, but
- 1% + 1 is a good guide.
- Ram harnesses can be used to monitor joining.

Pregnancy

- Check ewes are at target fat score three by day 100.

• Scan ewes for multiples about 100 days after the start of joining.
• Draft ewes into mobs on scanned information and manage accordingly.
• Avoid major changes in the nutrition of the ewe during pregnancy.
• Ewes of fat scores four and five need to be managed so they reduce at least half a fat score between day 90 and 118.
• Restrict nutrition in mid pregnancy if fat score needs controlling.
• Supplement as necessary.
• Vaccinate four to six weeks pre lambing.
• Control predators if necessary.

Lambing

• Ewes with multiples should get priority for paddocks with the best shelter and quality feed.
• Put ewes with multiples into lambing paddock one week prior to commencement of lambing.
• Put single-bearing ewes into lambing paddock after the first lamb is born.
• Mob size for lambing should be:
    • Multiple bearing ewes < 250 ewes
    • Single bearing ewes 400–500 ewes
    • Maiden ewes 250–400 ewes.
• Supplement ewes if feed is below 1,500 kg DM/ha (green).
• Feed supplements between 2pm and 4pm.
• Identify causes of lamb losses.

3.7 Readings

Chapters 10 and 11 of the International Sheep and Wool Handbook cover pregnancy, lambing, lactation and lamb growth.

The following *optional* readings are available on the LMS or e-reserve.

K. P. Golding, E. D. Wilson, P. D. Kemp, S. J. Pain, P. R. Kenyon, S. T. Morris and P. G. Hutton
Mixed herb and legume pasture improves the growth of lambs post-weaning *Animal Production Science*, 2011, **51**, 717–723

AuctionsPlus Pty Limited SHEEP ASSESSMENT MANUAL Effective 28 April 2009

Sheep CRC Practical Wisdom notes

- Successful pregnancy scanning
- The value of pregnancy scanning – should I do it?
- Managing ewes in late pregnancy
- Achieving a brilliant finish to your lambs
- On-farm impacts on meat eating quality
- Selection for growth and lean meat yield

Spreadsheets: Lamb cost of production; lamb growth predictor

Glossary of terms

Weaning	To separate lambs from ewes
Fat score	The amount of tissue manually palpated over the 12 rib, 110mm down from the middle of the back bone
ME	Metabolisable energy
Natural resistance	The resistance to internal parasites that an animal develops naturally with maturity
Digestibility	The proportion of intake that is absorbed by the animal's gut
Ovulation rate	The number of ova shed per ewe
Maiden ewe	Ewe joined for the first time
Cross bred ewe	Border Leicester X Merino ewe usually
Critical liveweight	Liveweight below which the percentage of dry ewes increases dramatically
Dry ewe	Non pregnant ewe
Implantation	Embedding of the fertilised embryo in the uterine wall
Anoestrus	Period of the year when ewes are not cycling
Ultra sound scanning/ real time scanning	The identification of dry, single or multiple bearing ewes
Predation	The taking or killing of live or dead lamb
Colostrum	Thick, milk like secretion from the udder for newly born lambs containing immunoglobulins
Fodder crops	Crops specifically planted to provide feed at strategic times of the year
Supplements	The strategic feeding of grain or hay